FIG. 1

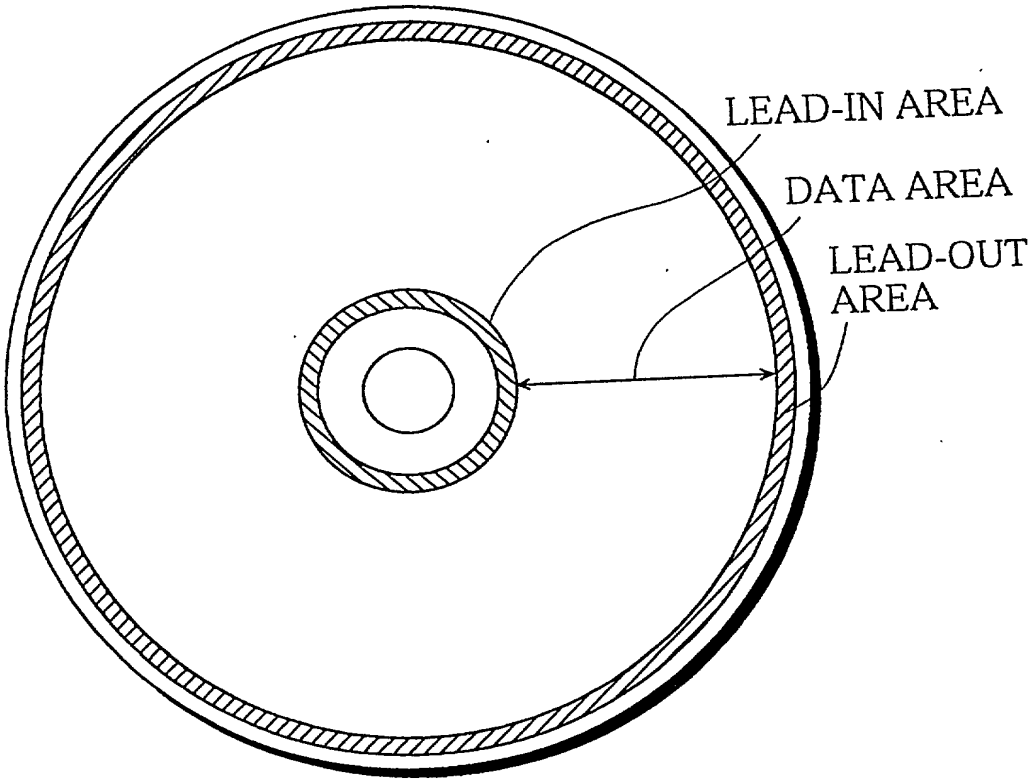


FIG. 2

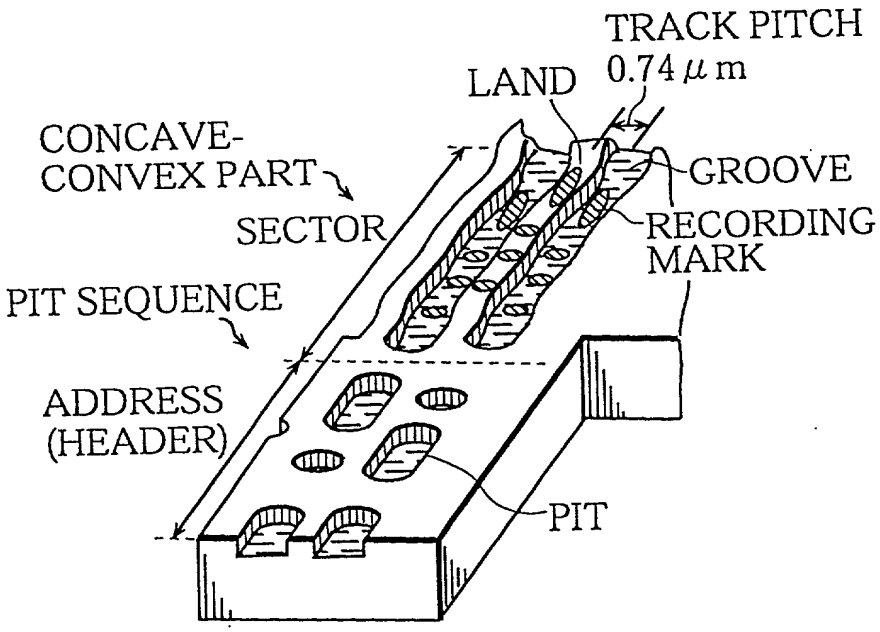

TRACK PITCH
0.74 μm
LAND
CONCAVE-
CONVEX PART
GROOVE
SECTOR
RECORDING
MARK
PIT SEQUENCE
ADDRESS
(HEADER)
PIT

FIG. 3A

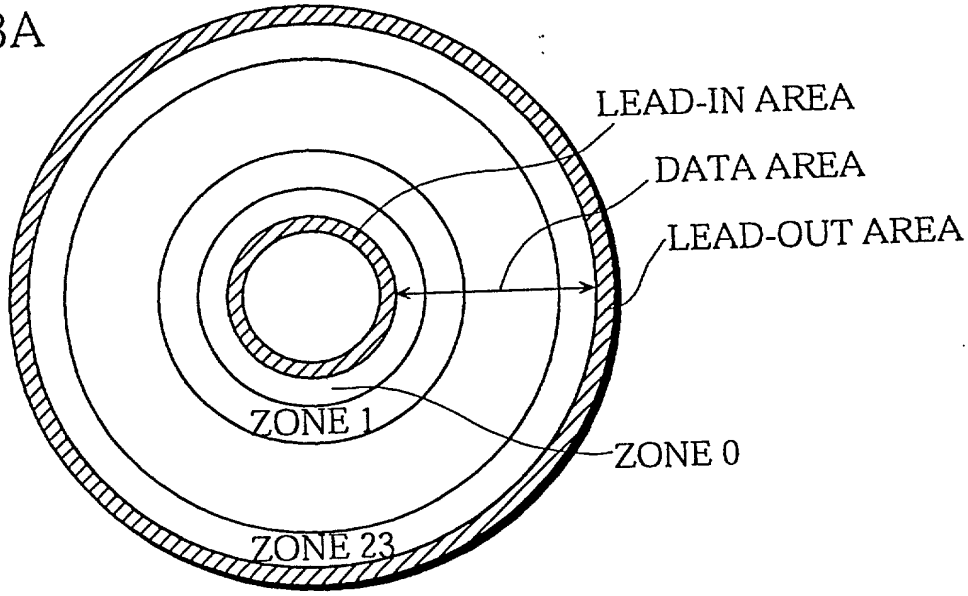


FIG. 3B

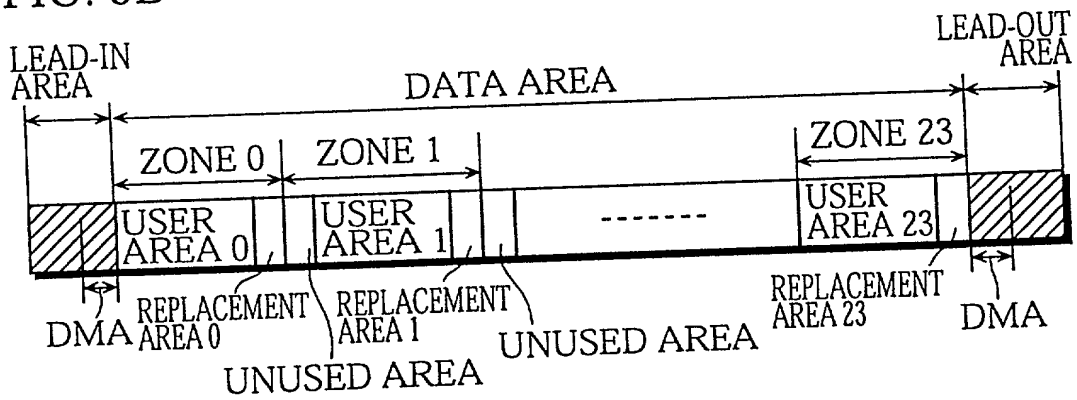


FIG. 3C

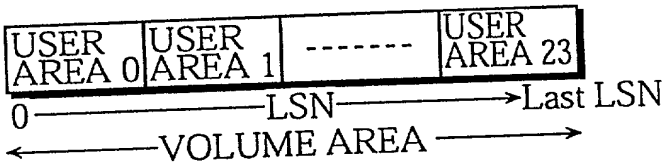


FIG. 3D

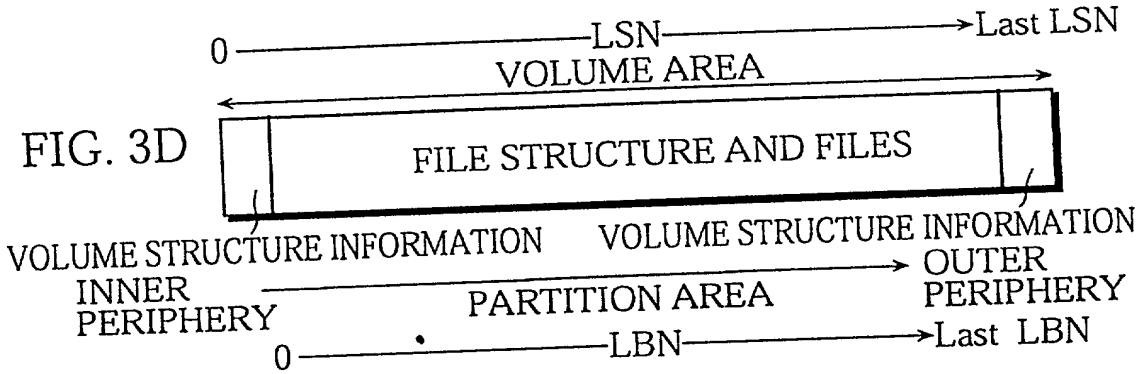


FIG. 4

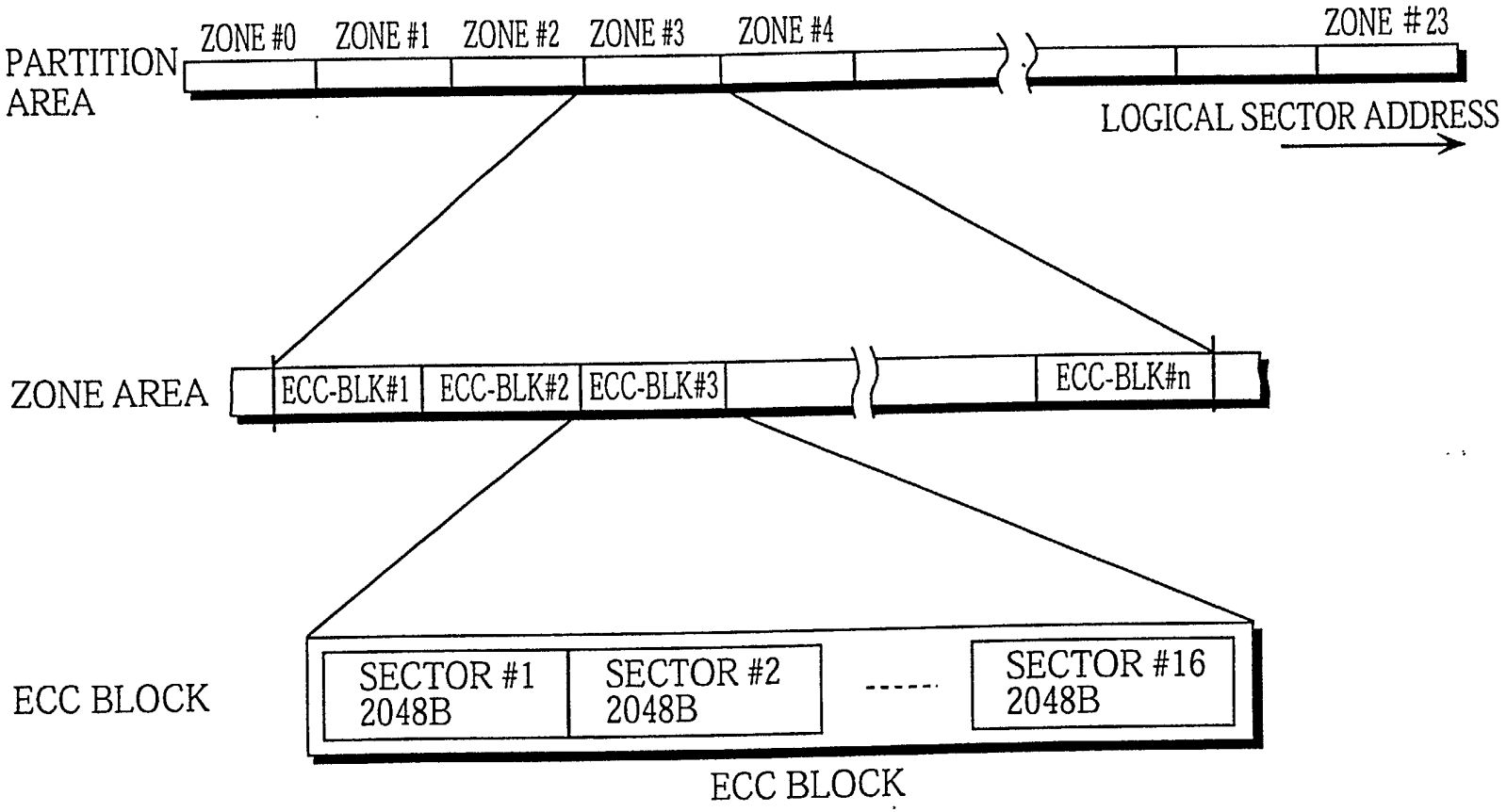

PARTITION AREA
ZONE #0
ZONE #1
ZONE #2
ZONE #3
ZONE #4
ZONE #23
LOGICAL SECTOR ADDRESS
ZONE AREA
ECC-BLK#1
ECC-BLK#2
ECC-BLK#3
ECC-BLK#n
ECC BLOCK
SECTOR #1 2048B
SECTOR #2 2048B
SECTOR #16 2048B
ECC BLOCK

FIG. 5

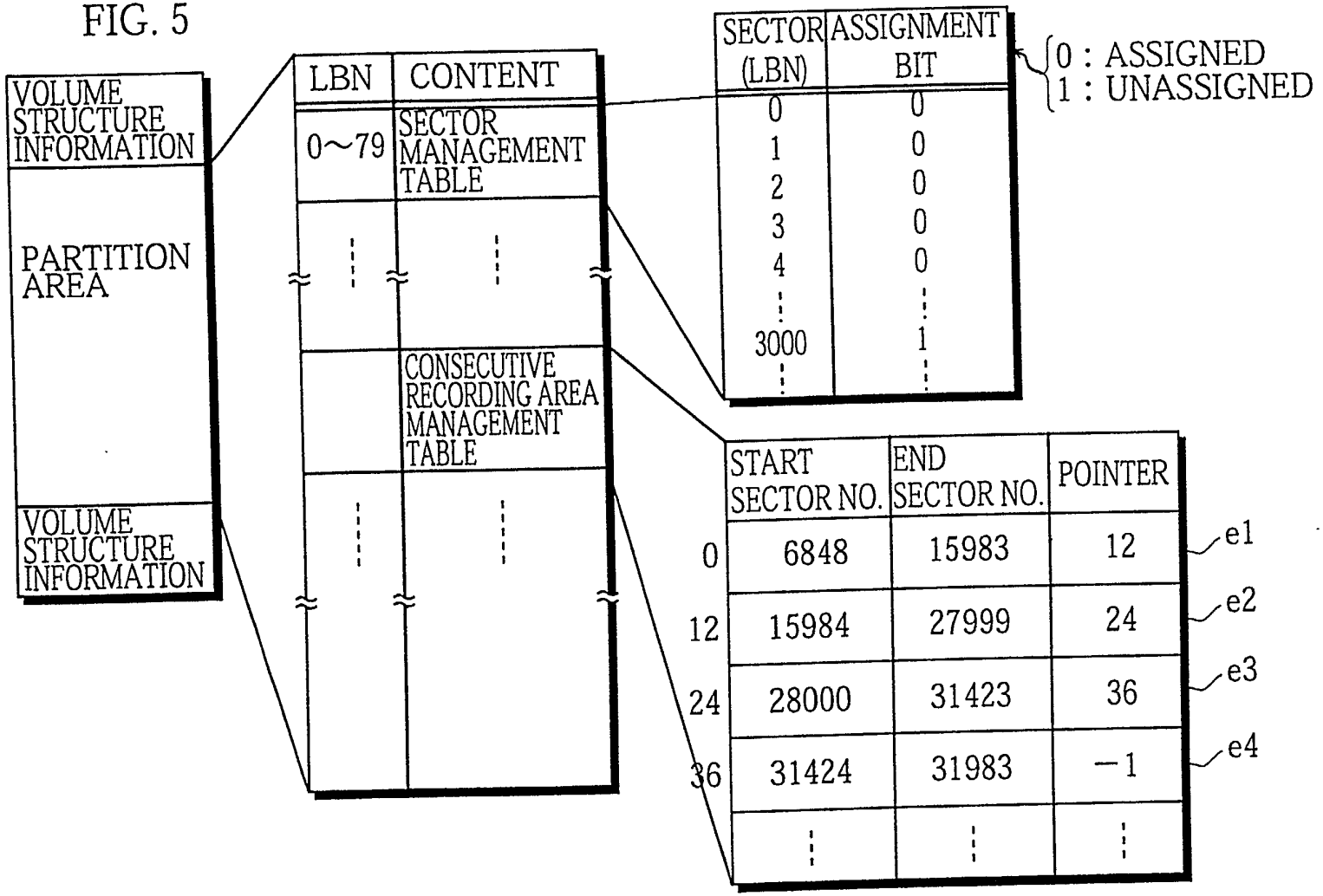

VOLUME STRUCTURE INFORMATION
PARTITION AREA
VOLUME STRUCTURE INFORMATION
LBN
CONTENT
0～79
SECTOR MANAGEMENT TABLE
CONSECUTIVE RECORDING AREA MANAGEMENT TABLE
SECTOR (LBN)
ASSIGNMENT BIT
0 : ASSIGNED
1 : UNASSIGNED
0
1
2
3
4
3000
START SECTOR NO.
END SECTOR NO.
POINTER
0
6848
15983
12
e1
12
15984
27999
24
e2
24
28000
31423
36
e3
36
31424
31983
−1
e4

FIG. 6

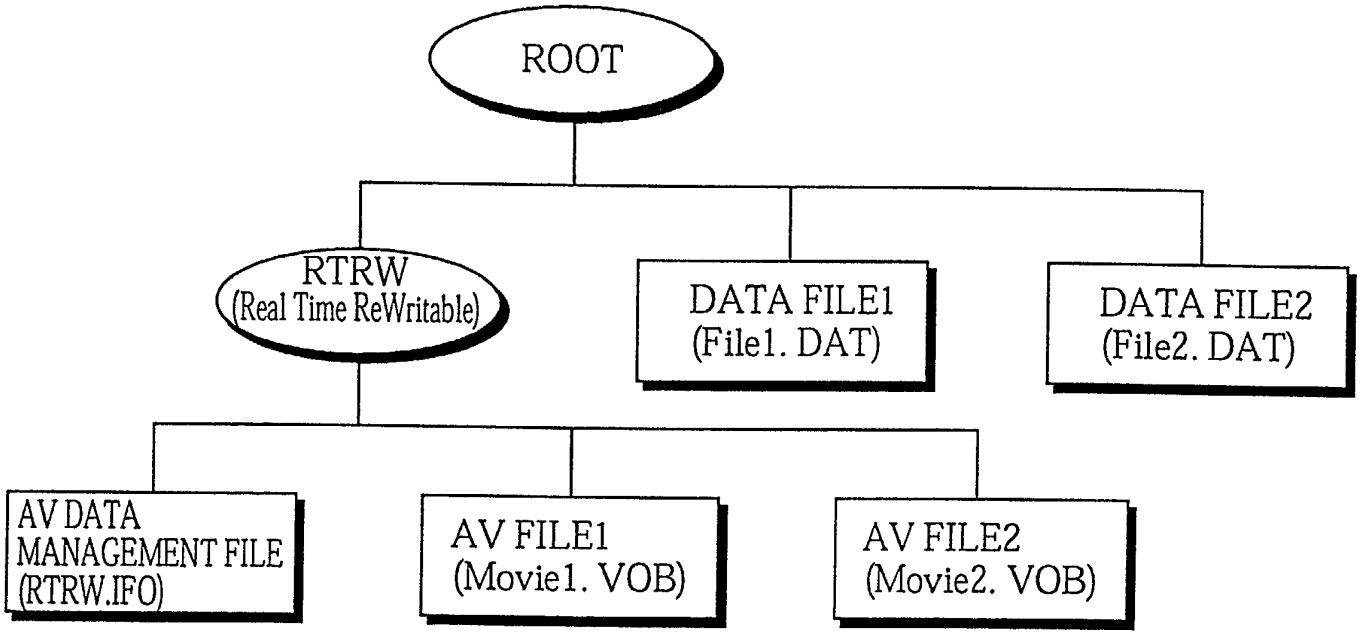

ROOT
RTRW
(Real Time ReWritable)
DATA FILE1
(File1. DAT)
DATA FILE2
(File2. DAT)
AV DATA
MANAGEMENT FILE
(RTRW.IFO)
AV FILE1
(Movie1. VOB)
AV FILE2
(Movie2. VOB)

FIG. 7

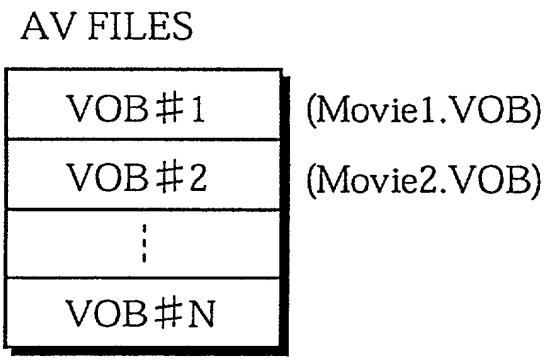


FIG. 8

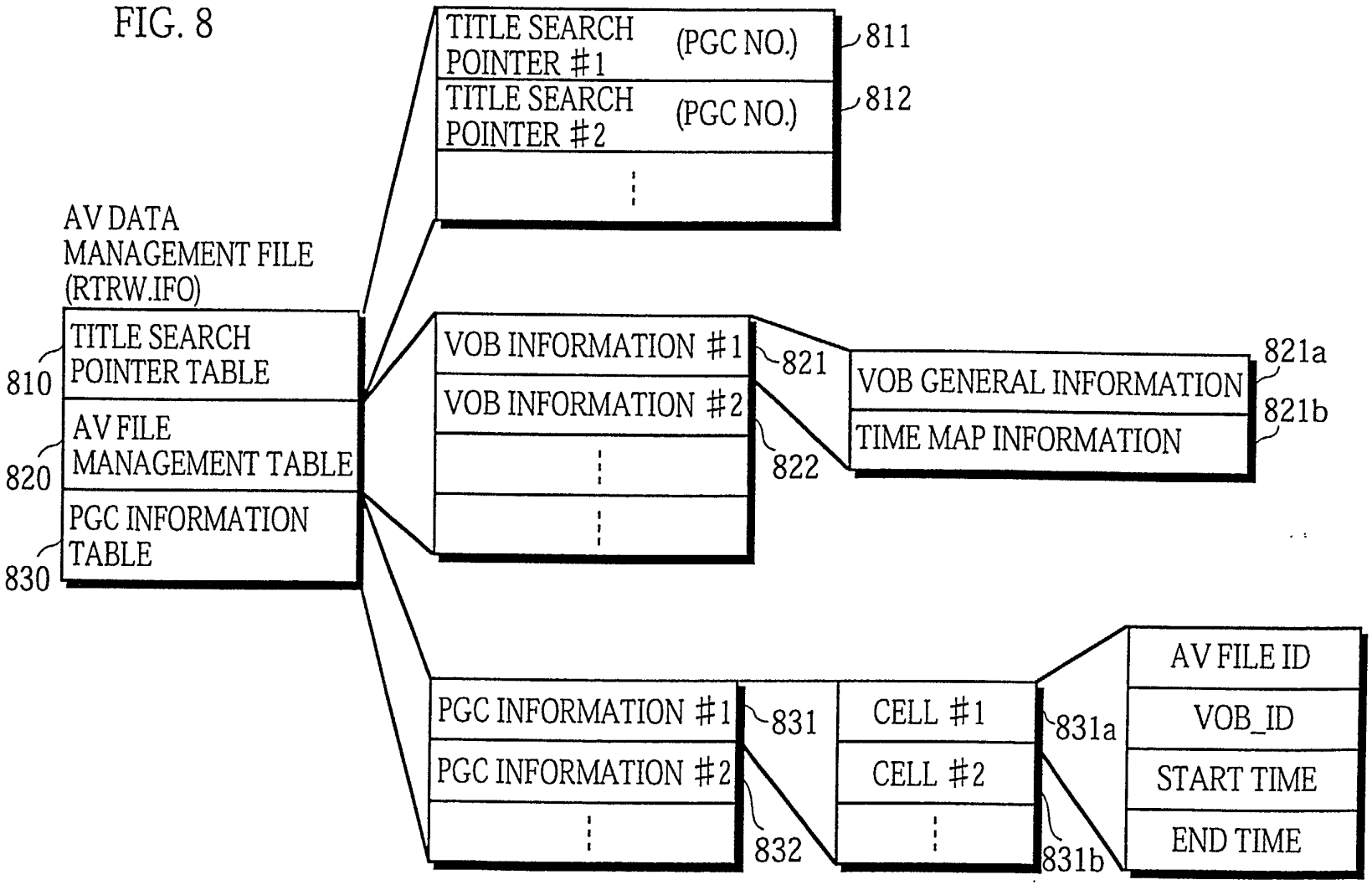

AV DATA MANAGEMENT FILE (RTRW.IFO)
TITLE SEARCH POINTER TABLE
AV FILE MANAGEMENT TABLE
PGC INFORMATION TABLE
810
820
830
TITLE SEARCH POINTER #1 (PGC NO.)
TITLE SEARCH POINTER #2 (PGC NO.)
811
812
VOB INFORMATION #1
VOB INFORMATION #2
821
822
VOB GENERAL INFORMATION
TIME MAP INFORMATION
821a
821b
PGC INFORMATION #1
PGC INFORMATION #2
831
832
CELL #1
CELL #2
831a
831b
AV FILE ID
VOB_ID
START TIME
END TIME

FIG. 9

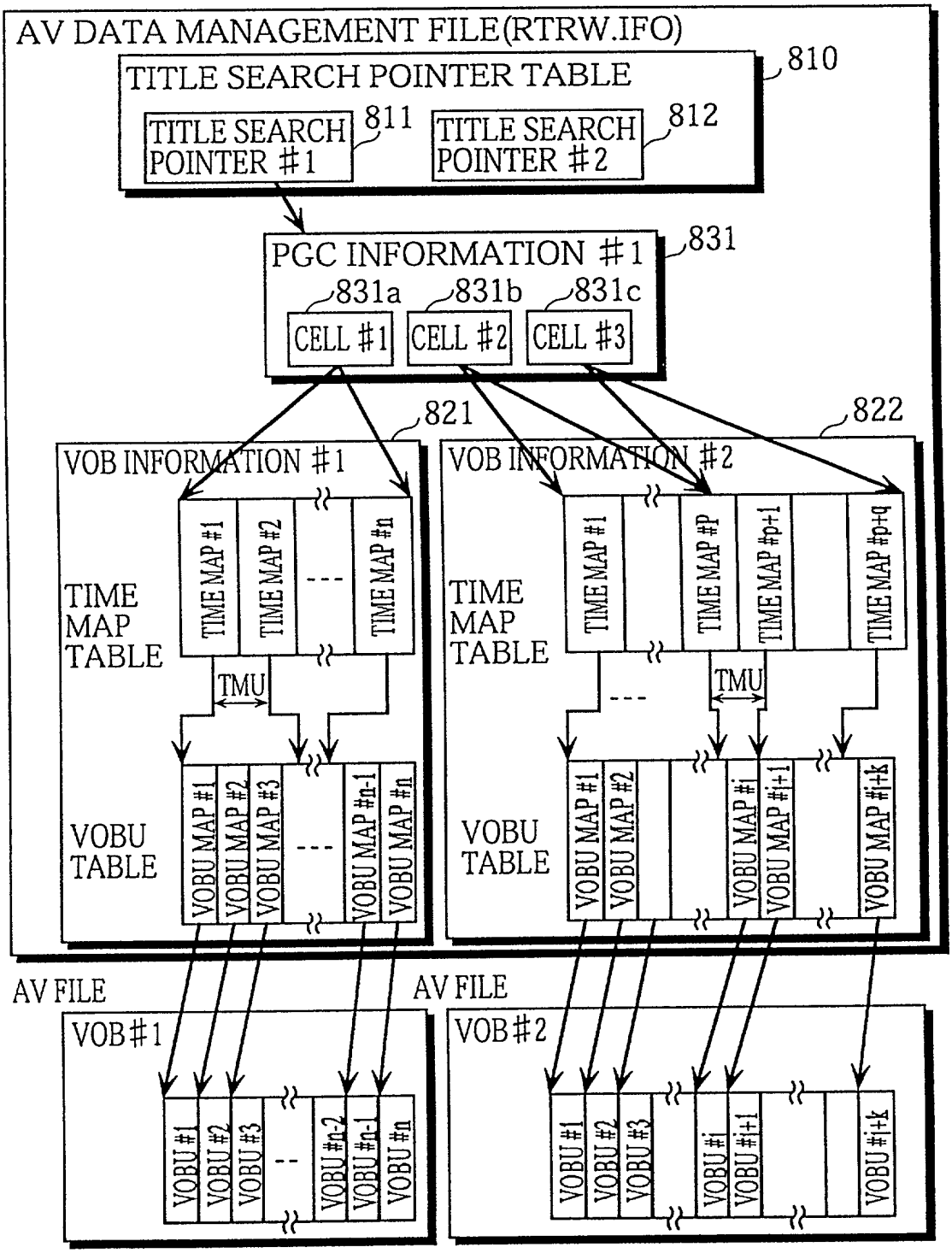

AV DATA MANAGEMENT FILE(RTRW.IFO)
TITLE SEARCH POINTER TABLE
810
TITLE SEARCH POINTER #1
811
TITLE SEARCH POINTER #2
812
PGC INFORMATION #1
831
831a
831b
831c
CELL #1
CELL #2
CELL #3
821
822
VOB INFORMATION #1
VOB INFORMATION #2
TIME MAP TABLE
TIME MAP #1
TIME MAP #2
TIME MAP #n
TIME MAP #P
TIME MAP #p+1
TIME MAP #p+q
TMU
VOBU TABLE
VOBU MAP #1
VOBU MAP #2
VOBU MAP #3
VOBU MAP #n-1
VOBU MAP #n
VOBU MAP #i
VOBU MAP #i+1
VOBU MAP #i+k
AV FILE
AV FILE
VOB#1
VOB#2
VOBU #1
VOBU #2
VOBU #3
VOBU #n-2
VOBU #n-1
VOBU #n
VOBU #i
VOBU #i+1
VOBU #i+k

FIG. 10

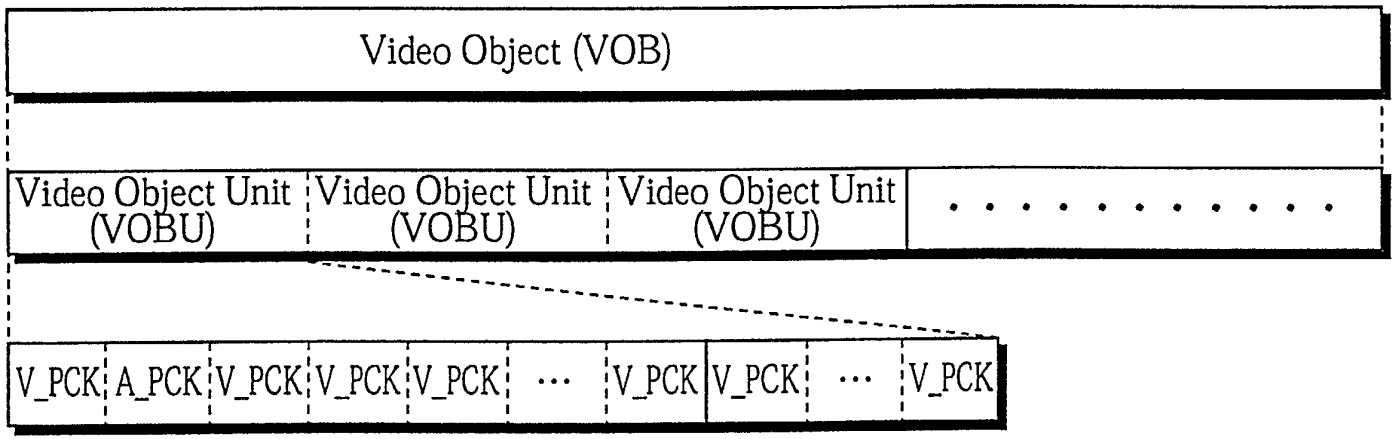
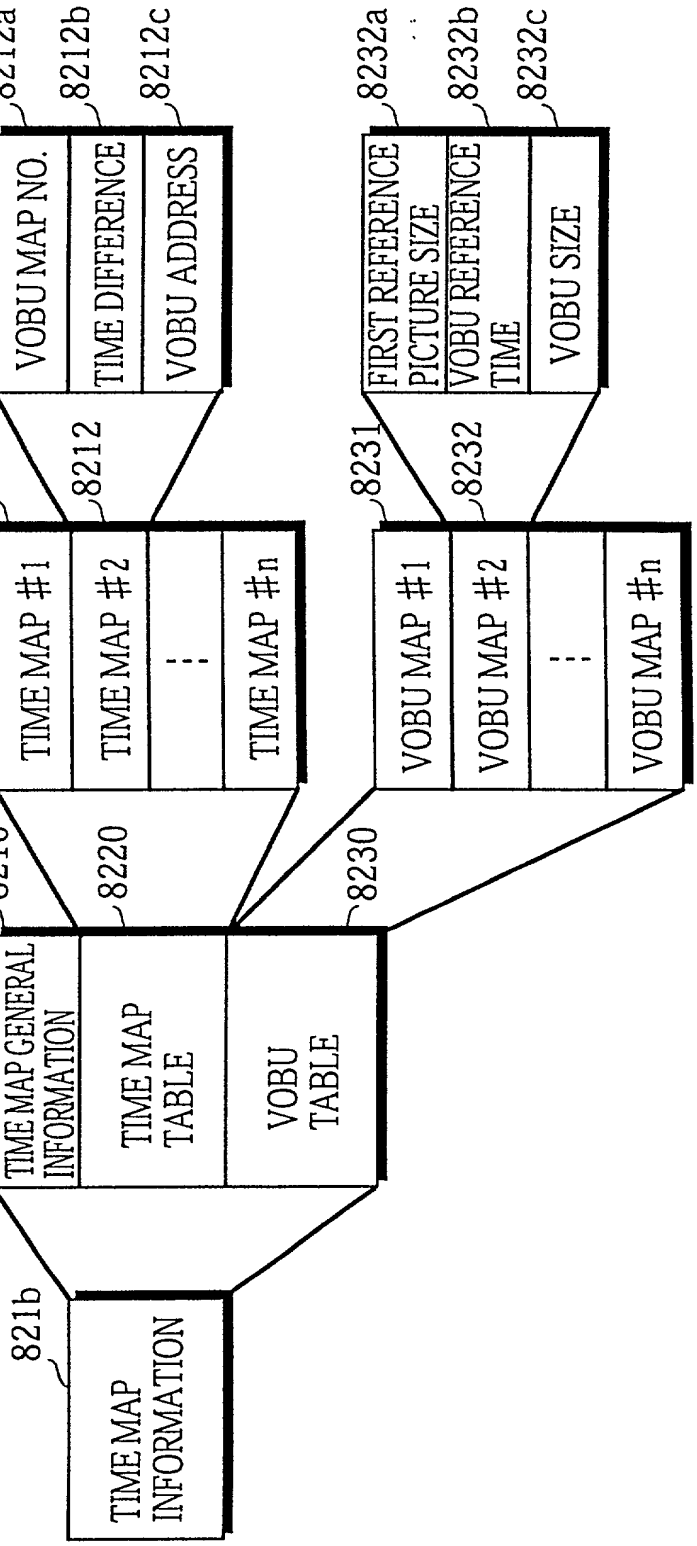

Video Object (VOB)
Video Object Unit (VOBU)
Video Object Unit (VOBU)
Video Object Unit (VOBU)
V_PCK
A_PCK
V_PCK
V_PCK
V_PCK
V_PCK
V_PCK
V_PCK
V_PCK

FIG. 11


821b
TIME MAP INFORMATION
8210
TIME MAP GENERAL INFORMATION
8220
TIME MAP TABLE
8230
VOBU TABLE
8211
8212
TIME MAP #1
TIME MAP #2
TIME MAP #n
8212a
8212b
8212c
VOBU MAP NO.
TIME DIFFERENCE
VOBU ADDRESS
8231
8232
VOBU MAP #1
VOBU MAP #2
VOBU MAP #n
8232a
8232b
8232c
FIRST REFERENCE PICTURE SIZE
VOBU REFERENCE TIME
VOBU SIZE

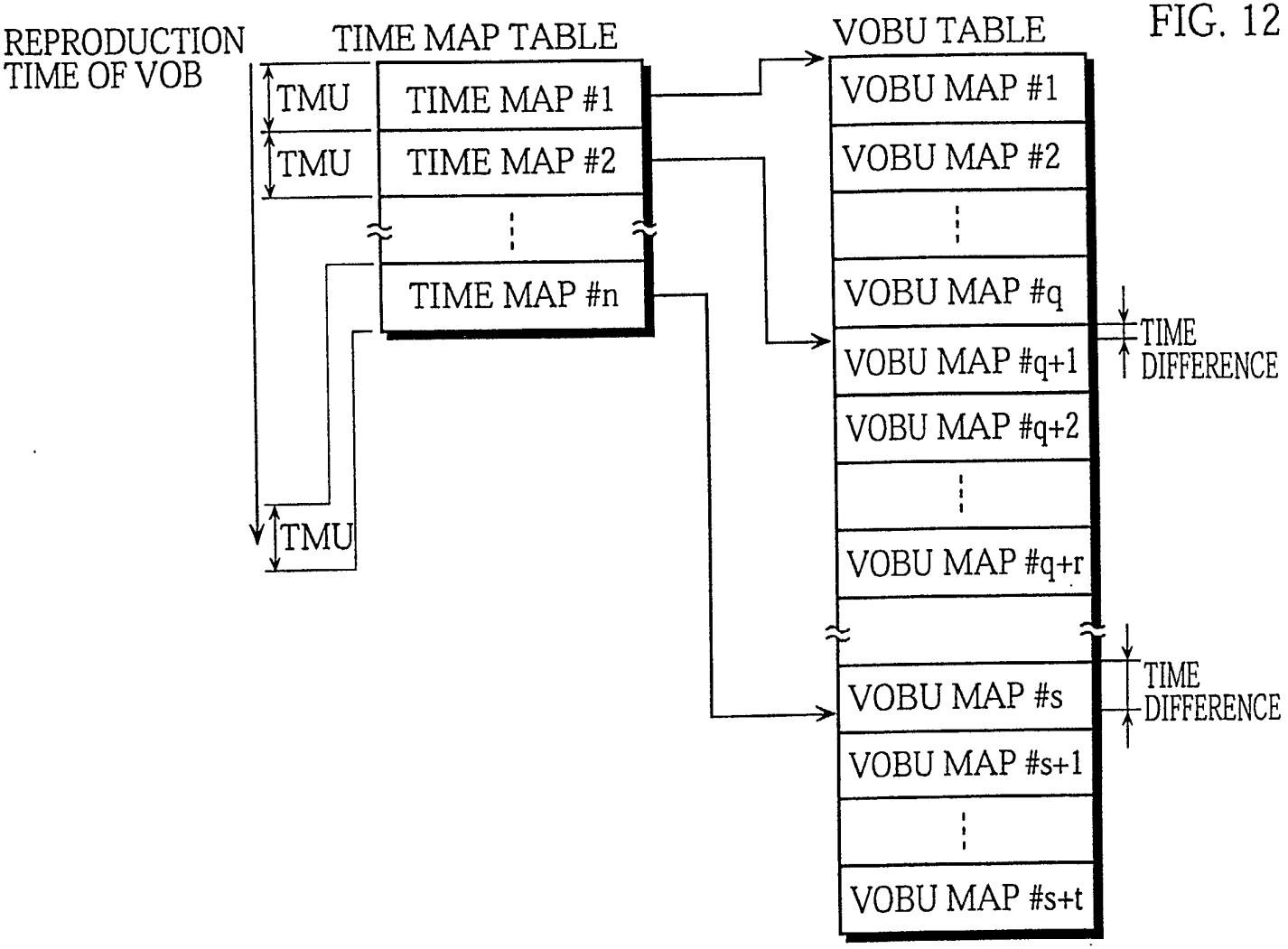
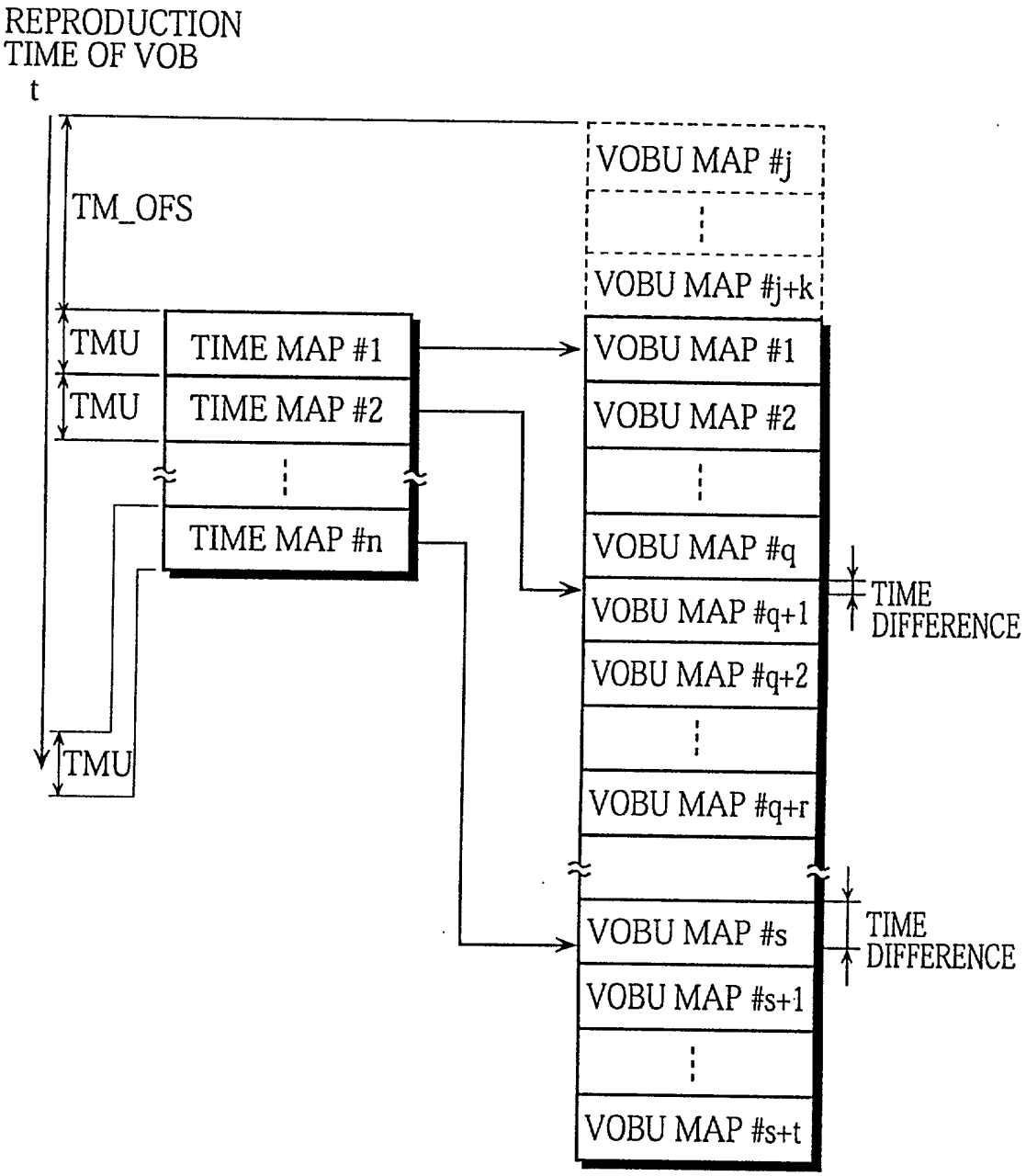

REPRODUCTION TIME OF VOB
TIME MAP TABLE
TMU
TMU
TMU
TIME MAP #1
TIME MAP #2
TIME MAP #n
VOBU TABLE
VOBU MAP #1
VOBU MAP #2
VOBU MAP #q
VOBU MAP #q+1
VOBU MAP #q+2
VOBU MAP #q+r
VOBU MAP #s
VOBU MAP #s+1
VOBU MAP #s+t
TIME DIFFERENCE
TIME DIFFERENCE

FIG. 12

FIG. 13


REPRODUCTION TIME OF VOB
t
TM_OFS
TMU
TMU
TMU
TIME MAP #1
TIME MAP #2
TIME MAP #n
VOBU MAP #j
VOBU MAP #j+k
VOBU MAP #1
VOBU MAP #2
VOBU MAP #q
VOBU MAP #q+1
VOBU MAP #q+2
VOBU MAP #q+r
VOBU MAP #s
VOBU MAP #s+1
VOBU MAP #s+t
TIME DIFFERENCE
TIME DIFFERENCE

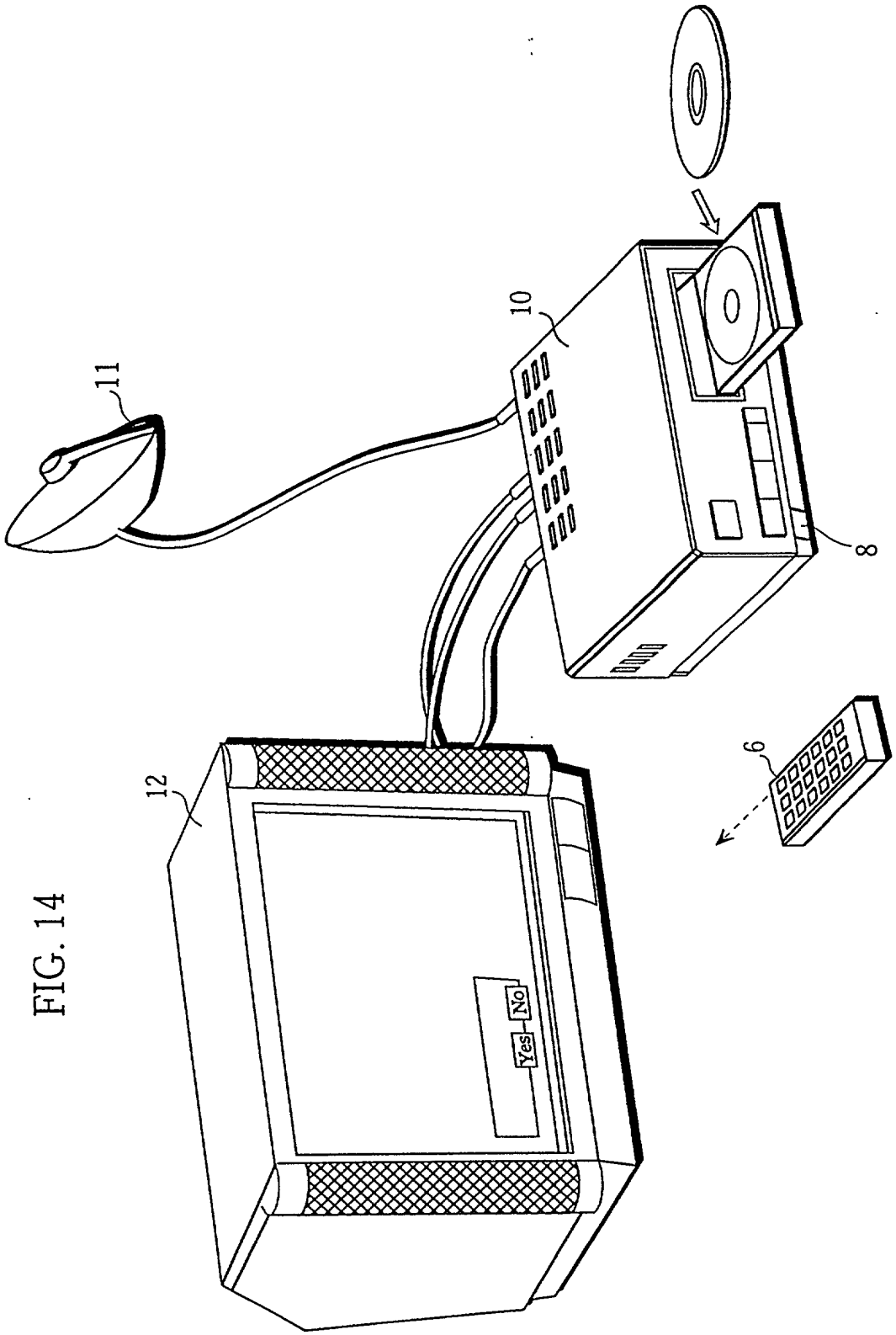


FIG. 14

FIG. 15

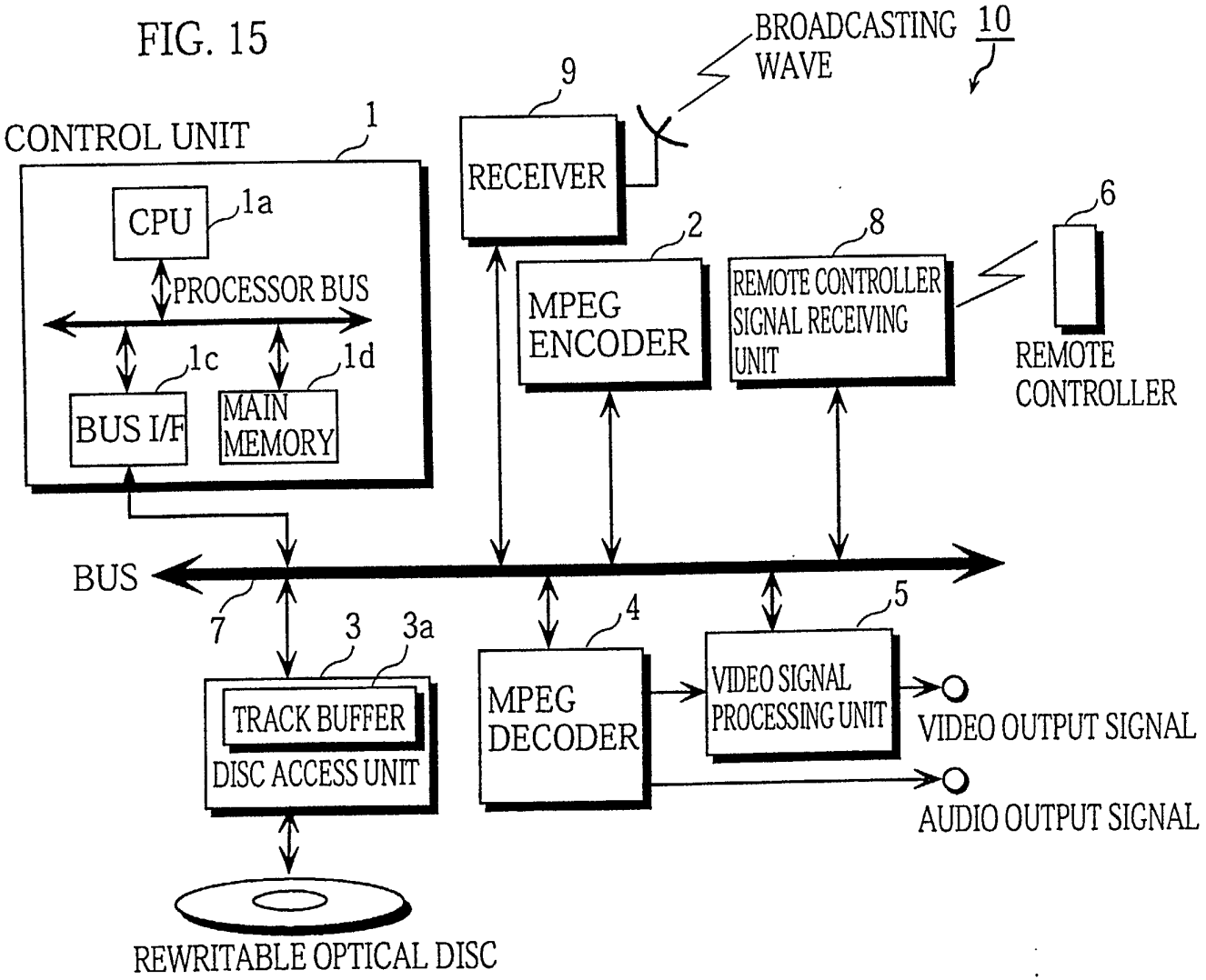

BROADCASTING WAVE
10
9
RECEIVER
CONTROL UNIT
1
CPU
1a
PROCESSOR BUS
1c
1d
BUS I/F
MAIN MEMORY
2
MPEG ENCODER
8
REMOTE CONTROLLER SIGNAL RECEIVING UNIT
6
REMOTE CONTROLLER
BUS
7
3
3a
TRACK BUFFER
DISC ACCESS UNIT
4
MPEG DECODER
5
VIDEO SIGNAL PROCESSING UNIT
VIDEO OUTPUT SIGNAL
AUDIO OUTPUT SIGNAL
REWRITABLE OPTICAL DISC

FIG. 16

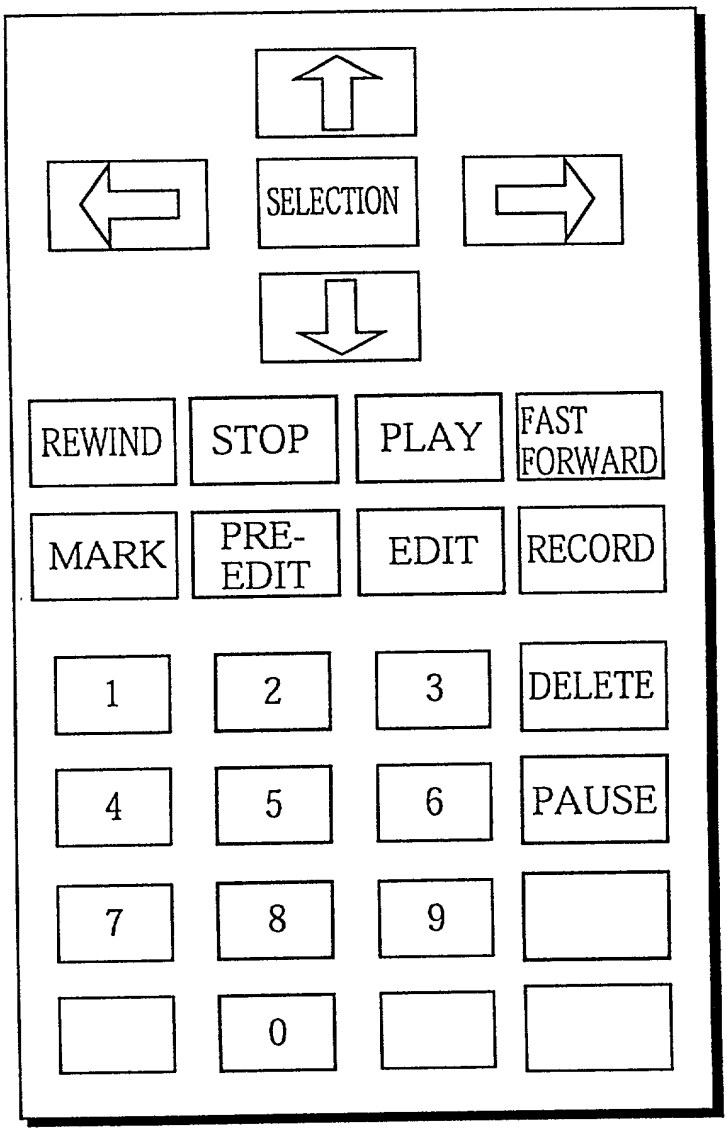

SELECTION
REWIND
STOP
PLAY
FAST FORWARD
MARK
PRE-EDIT
EDIT
RECORD
1
2
3
DELETE
4
5
6
PAUSE
7
8
9
0

FIG. 17

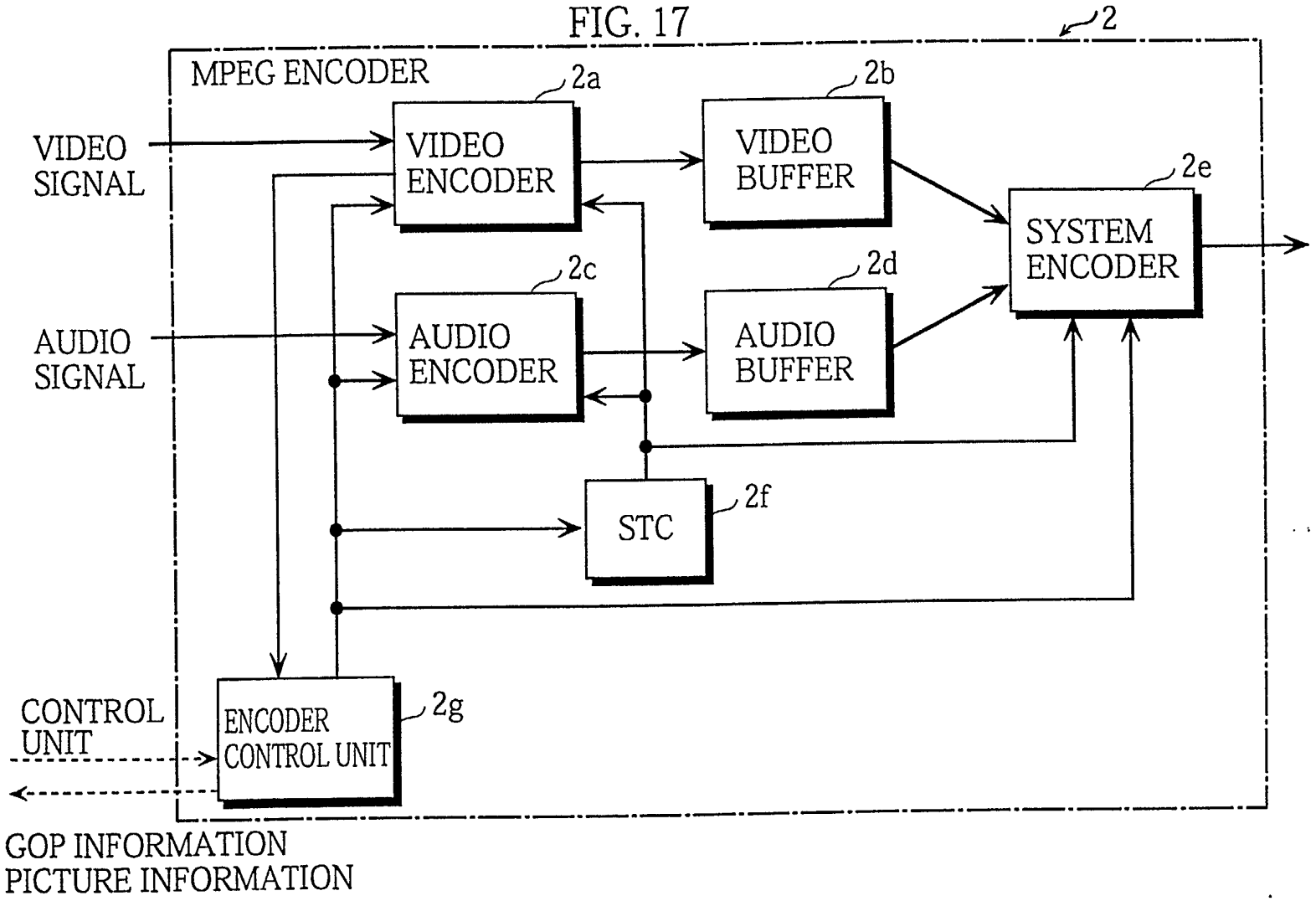

2
MPEG ENCODER
2a
2b
VIDEO SIGNAL
VIDEO ENCODER
VIDEO BUFFER
2e
SYSTEM ENCODER
2c
2d
AUDIO SIGNAL
AUDIO ENCODER
AUDIO BUFFER
2f
STC
CONTROL UNIT
ENCODER CONTROL UNIT
2g
GOP INFORMATION
PICTURE INFORMATION

FIG. 18

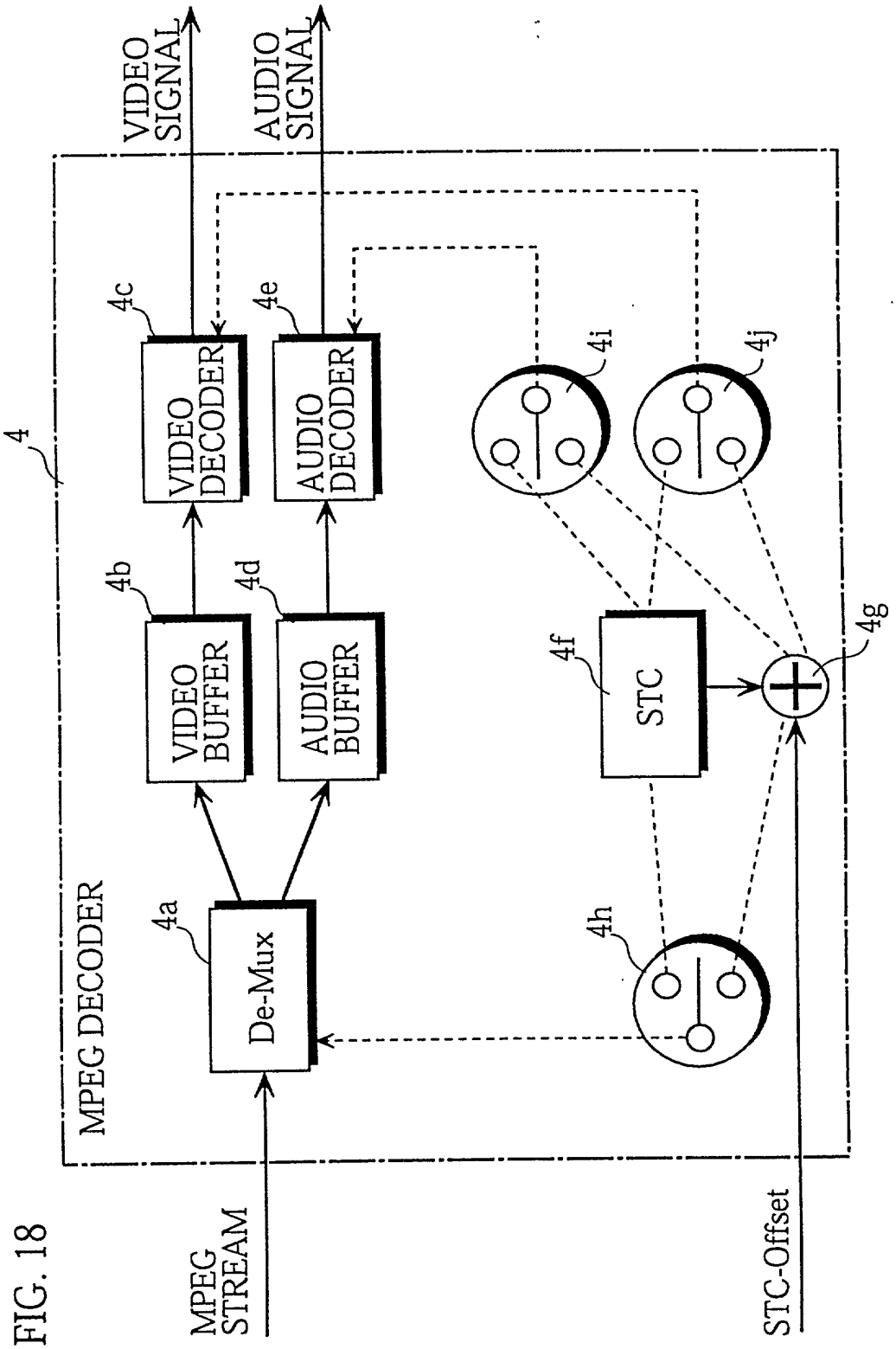

MPEG DECODER
4
MPEG STREAM
De-Mux
4a
VIDEO BUFFER
4b
AUDIO BUFFER
4d
VIDEO DECODER
4c
AUDIO DECODER
4e
VIDEO SIGNAL
AUDIO SIGNAL
STC
4f
4g
STC-Offset
4h
4i
4j

FIG. 19

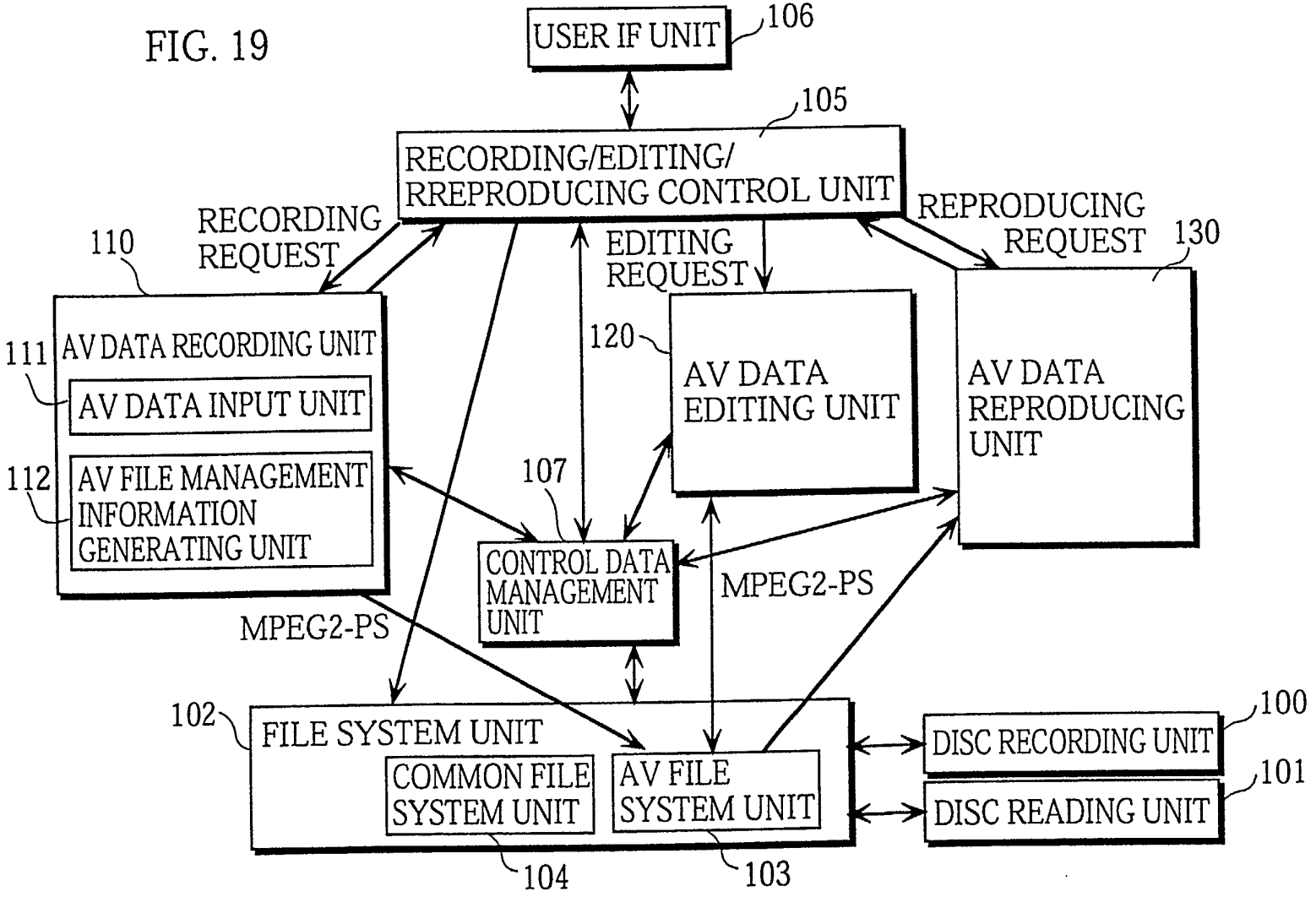

USER IF UNIT
106
105
RECORDING/EDITING/
RREPRODUCING CONTROL UNIT
RECORDING
REQUEST
EDITING
REQUEST
REPRODUCING
REQUEST
130
110
111
AV DATA RECORDING UNIT
AV DATA INPUT UNIT
112
AV FILE MANAGEMENT
INFORMATION
GENERATING UNIT
120
AV DATA
EDITING UNIT
AV DATA
REPRODUCING
UNIT
107
CONTROL DATA
MANAGEMENT
UNIT
MPEG2-PS
MPEG2-PS
102
FILE SYSTEM UNIT
COMMON FILE
SYSTEM UNIT
AV FILE
SYSTEM UNIT
104
103
100
DISC RECORDING UNIT
101
DISC READING UNIT

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FIG. 20

COMMON FILE SYSTEM UNIT 104	
CREATE	GENERATE A FILE
DELTE	DELETE A FILE
OPEN	OPEN A FILE
CLOSE	CLOSE A FILE
WRITE	WRITE A NON-AV FILE
READ	READ A FILE(COMMON TO AV AND NON-AV)
SEEK	MOVE INSIDE A DATA STREAM
RENAME	CHANGE A FILE NAME
MKDIR	GENERATE A DIRECTORY
RMDIR	REMOVE A DIRECTORY
STATFS	OBTAIN A FILE SYSTEM STATE
GET-ATTR	OBTAIN A FILE ATTRIBUTE
SET-ATTR	SET A FILE ATTRIBUTE
SEARCH_DISCON	DETECT WHETHER A SPECIFIED SECTION INCLUDES A DISCONTINUOUS BOUNDARY(ZONE BOUNDARY)

AV FILE SYSTEM UNIT 103	
MERGE	MERGE OF AVFILE1+BUFFER+AV FILE2
SPLIT	SPLIT AN AV FILE
SHORTEN	DELETE AN EDGE OF AV FILE
REPLACE	REPLACE A PART OF AV FILE

FIG. 21

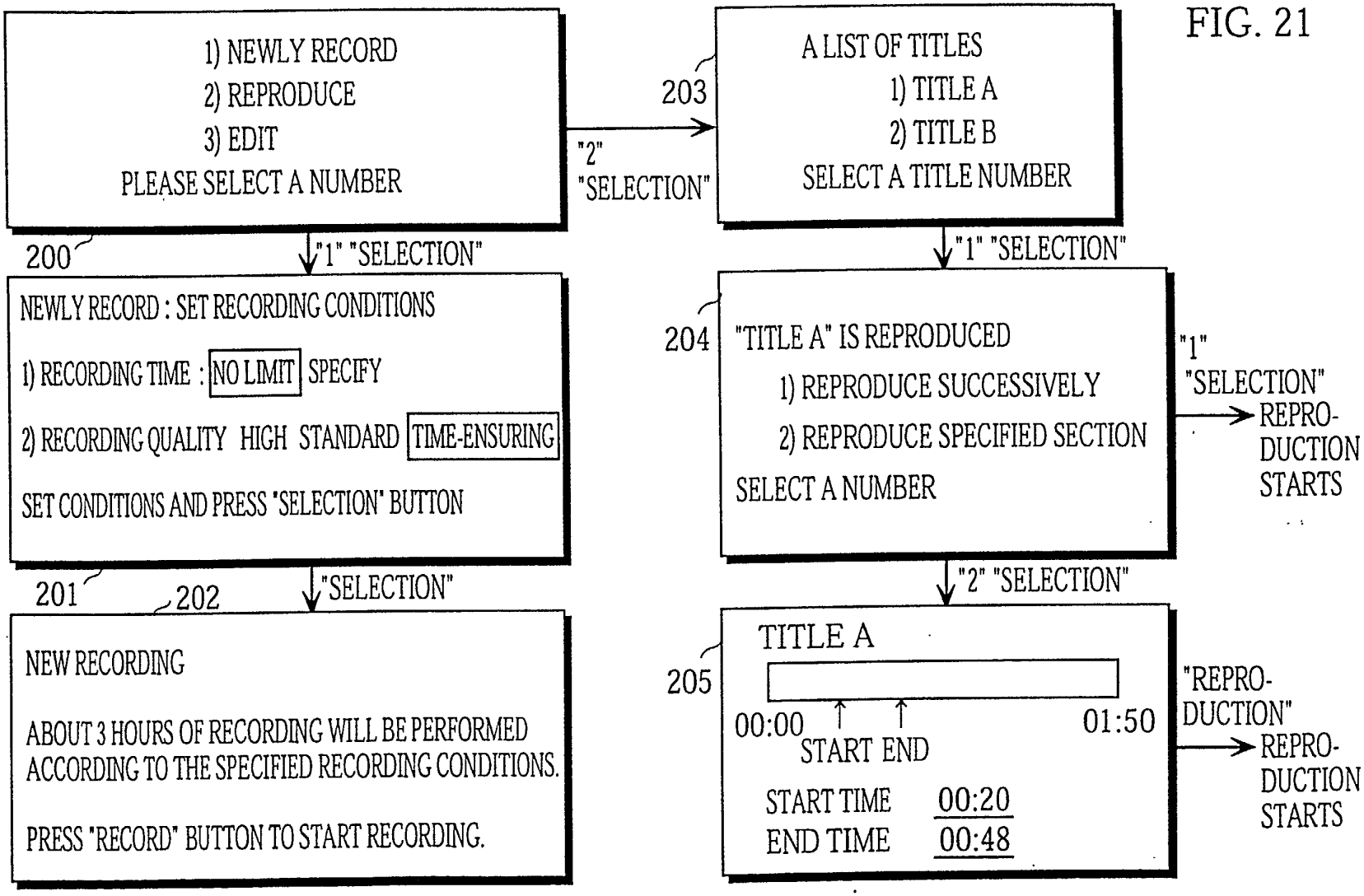
1) NEWLY RECORD
2) REPRODUCE
3) EDIT
PLEASE SELECT A NUMBER
200
"1" "SELECTION"
NEWLY RECORD : SET RECORDING CONDITIONS
1) RECORDING TIME : NO LIMIT SPECIFY
2) RECORDING QUALITY HIGH STANDARD TIME-ENSURING
SET CONDITIONS AND PRESS "SELECTION" BUTTON
201
202
"SELECTION"
NEW RECORDING
ABOUT 3 HOURS OF RECORDING WILL BE PERFORMED ACCORDING TO THE SPECIFIED RECORDING CONDITIONS.
PRESS "RECORD" BUTTON TO START RECORDING.
"2" "SELECTION"
203
A LIST OF TITLES
1) TITLE A
2) TITLE B
SELECT A TITLE NUMBER
"1" "SELECTION"
204
"TITLE A" IS REPRODUCED
1) REPRODUCE SUCCESSIVELY
2) REPRODUCE SPECIFIED SECTION
SELECT A NUMBER
"1" "SELECTION"
REPRO-DUCTION STARTS
"2" "SELECTION"
205
TITLE A
00:00
START END
01:50
START TIME 00:20
END TIME 00:48
"REPRO-DUCTION"
REPRO-DUCTION STARTS

FIG. 22

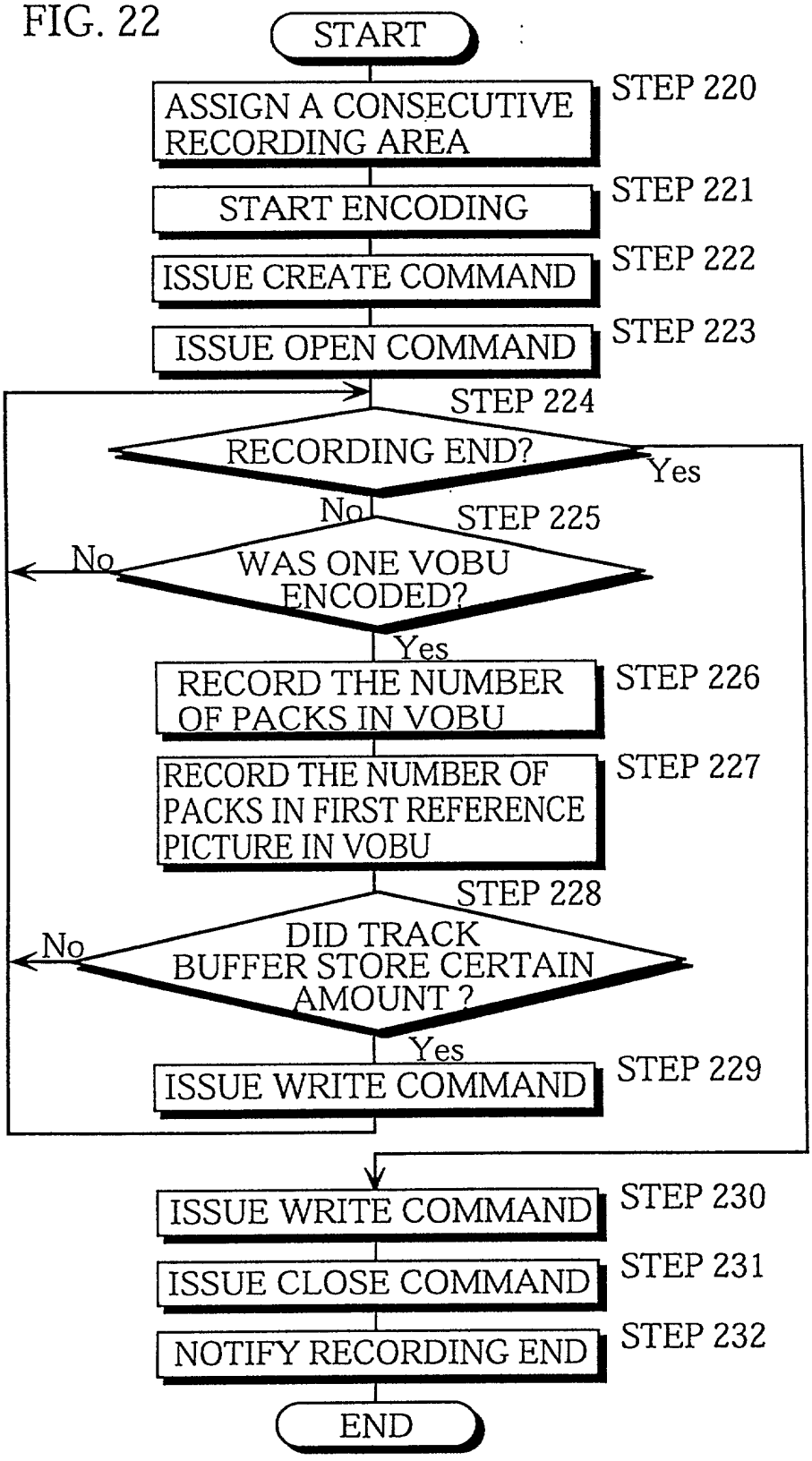
START
ASSIGN A CONSECUTIVE RECORDING AREA
STEP 220
START ENCODING
STEP 221
ISSUE CREATE COMMAND
STEP 222
ISSUE OPEN COMMAND
STEP 223
STEP 224
RECORDING END?
Yes
No
STEP 225
WAS ONE VOBU ENCODED?
No
Yes
RECORD THE NUMBER OF PACKS IN VOBU
STEP 226
RECORD THE NUMBER OF PACKS IN FIRST REFERENCE PICTURE IN VOBU
STEP 227
STEP 228
DID TRACK BUFFER STORE CERTAIN AMOUNT ?
No
Yes
ISSUE WRITE COMMAND
STEP 229
ISSUE WRITE COMMAND
STEP 230
ISSUE CLOSE COMMAND
STEP 231
NOTIFY RECORDING END
STEP 232
END

FIG. 23

VOBU NO.	NUMBER OF PACKS IN FIRST REFERENCE PICTURE IN VOBU	NUMBER OF PACKS IN VOBU
#1	14	46
#2	15	51
#3	13	49
#4	14	47
#5	14	46
#6	15	51
#7	13	49
#8	14	47
#9	14	46
#10	15	51
#11	13	49
#12	14	47
⋮	⋮	⋮
#21	15	51
#22	13	49
⋮	⋮	⋮

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FIG. 24

PROCESS BY THE AV FILE MANAGEMENT INFORMATION GENERATING UNIT 112

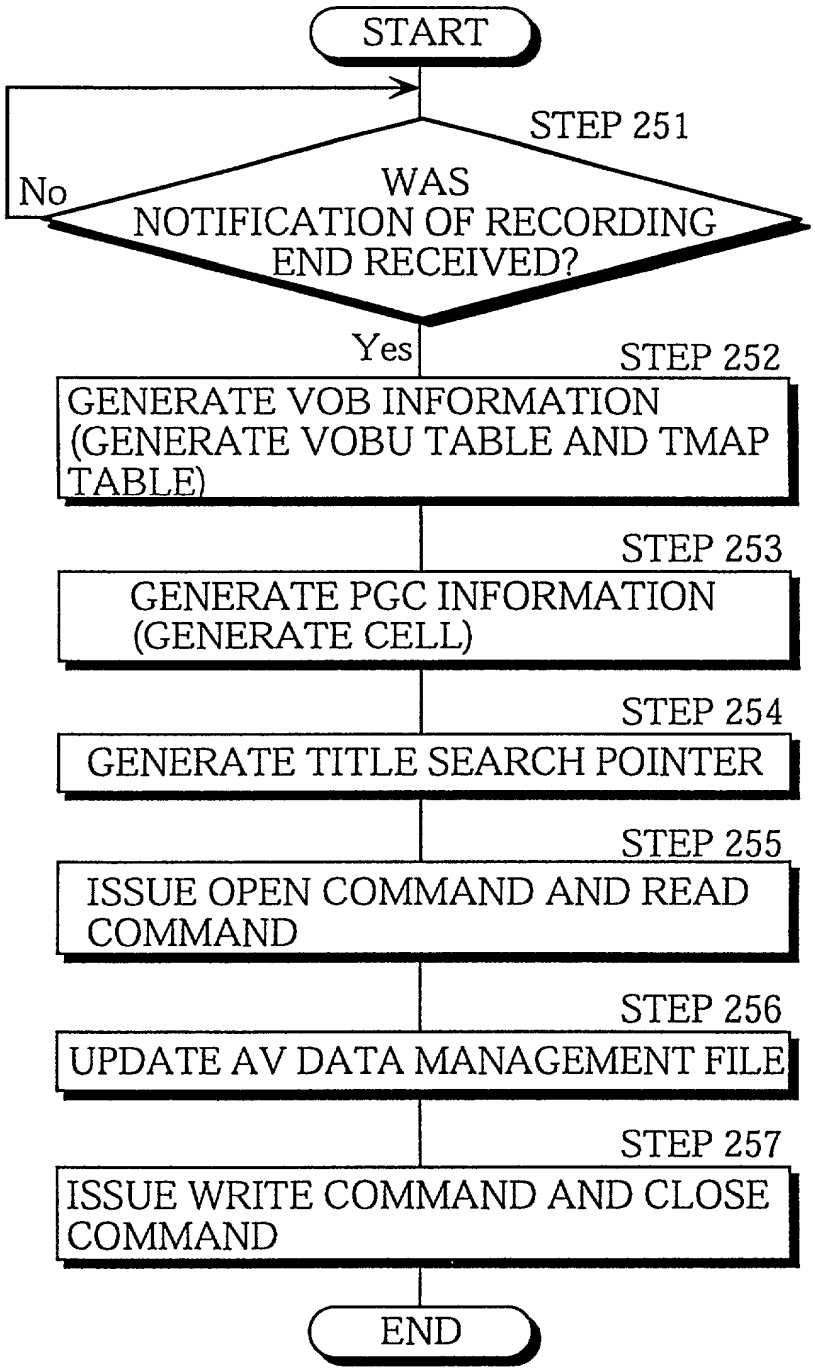


FIG. 25

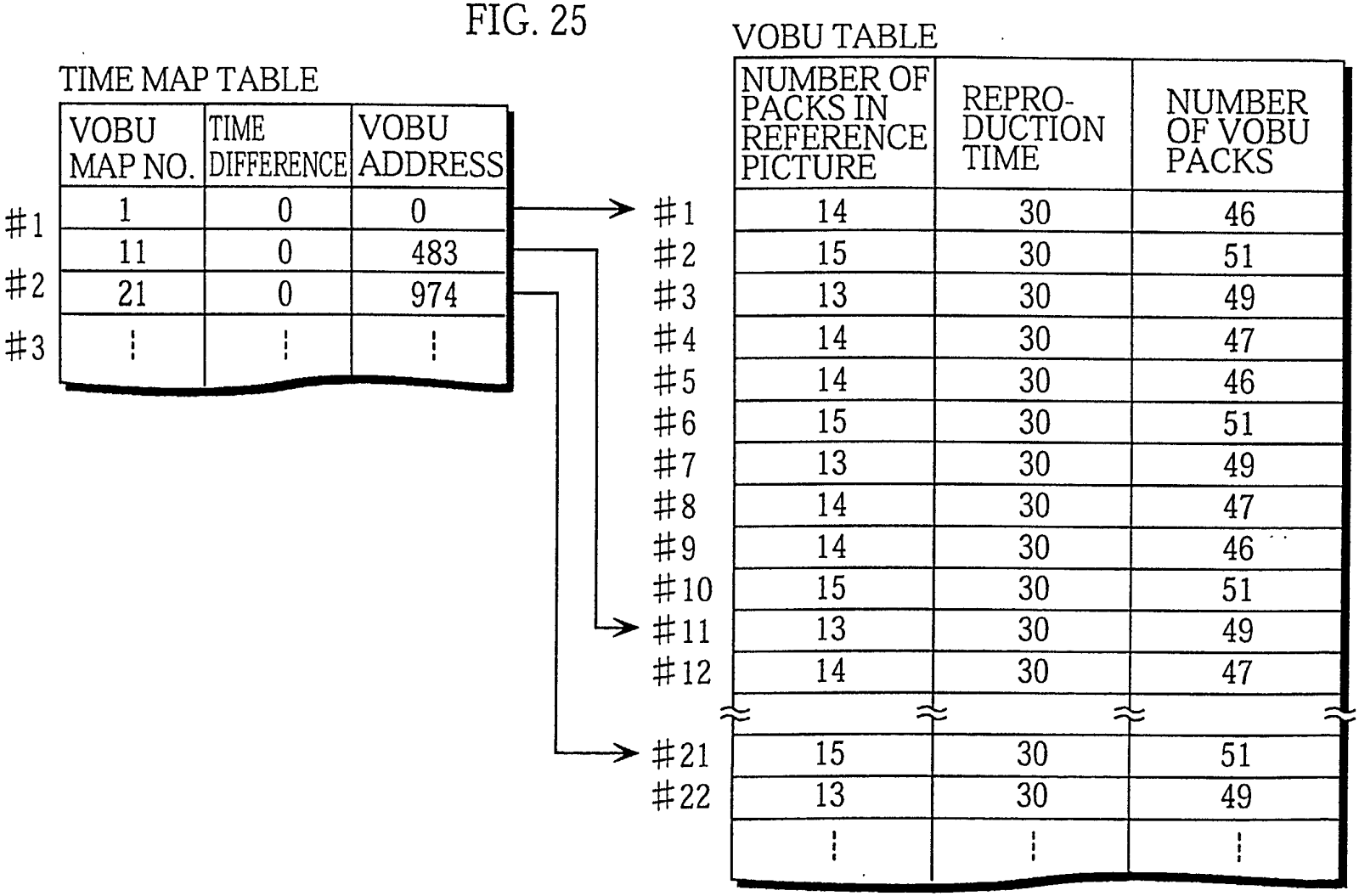

TIME MAP TABLE
VOBU MAP NO.
TIME DIFFERENCE
VOBU ADDRESS
#1
1
0
0
#2
11
0
483
#3
21
0
974
VOBU TABLE
NUMBER OF PACKS IN REFERENCE PICTURE
REPRO-DUCTION TIME
NUMBER OF VOBU PACKS
#1 14 30 46
#2 15 30 51
#3 13 30 49
#4 14 30 47
#5 14 30 46
#6 15 30 51
#7 13 30 49
#8 14 30 47
#9 14 30 46
#10 15 30 51
#11 13 30 49
#12 14 30 47
#21 15 30 51
#22 13 30 49

FIG. 26

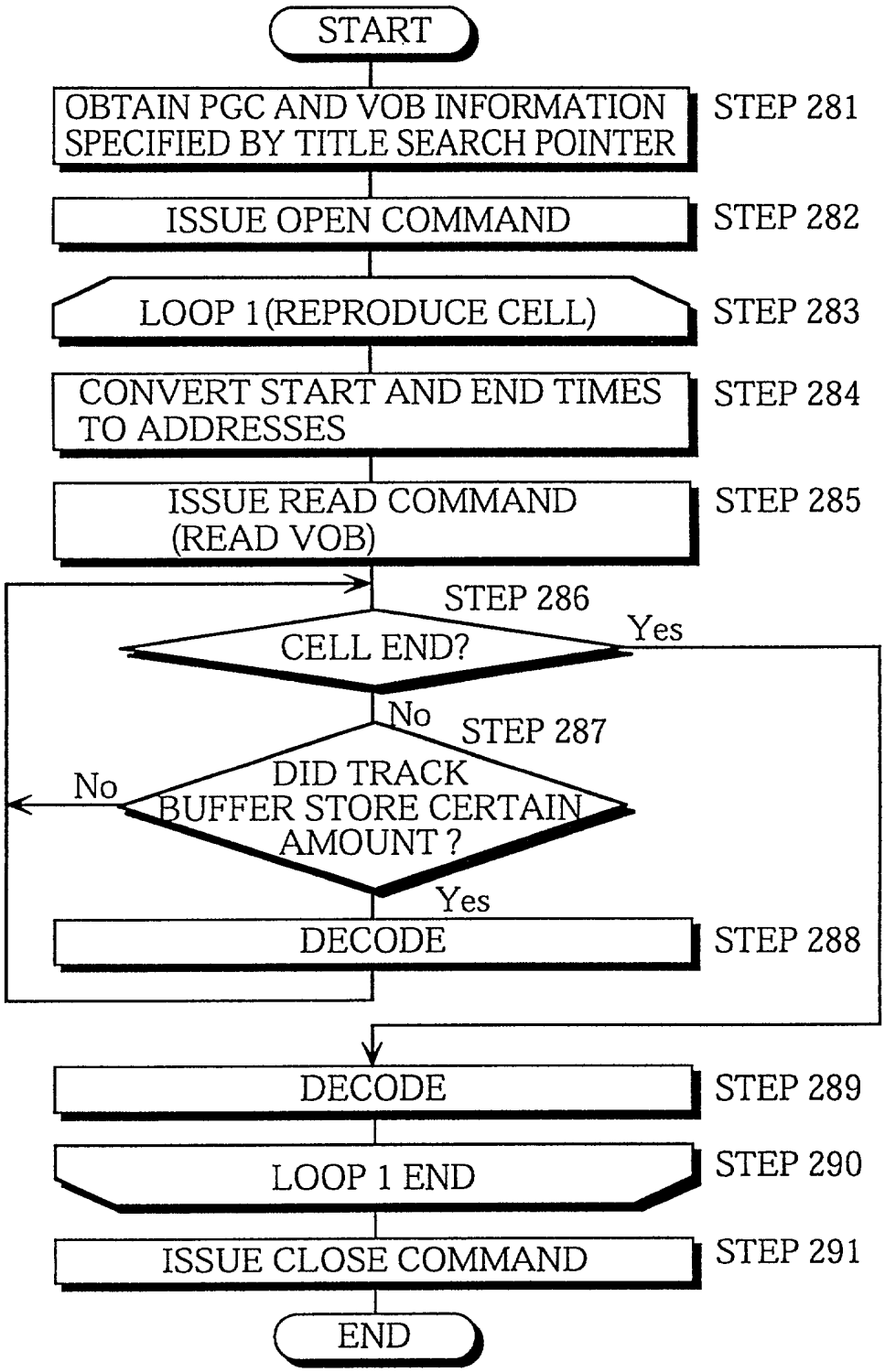

START
OBTAIN PGC AND VOB INFORMATION SPECIFIED BY TITLE SEARCH POINTER
STEP 281
ISSUE OPEN COMMAND
STEP 282
LOOP 1(REPRODUCE CELL)
STEP 283
CONVERT START AND END TIMES TO ADDRESSES
STEP 284
ISSUE READ COMMAND (READ VOB)
STEP 285
STEP 286
CELL END?
Yes
No
STEP 287
DID TRACK BUFFER STORE CERTAIN AMOUNT?
No
Yes
DECODE
STEP 288
DECODE
STEP 289
LOOP 1 END
STEP 290
ISSUE CLOSE COMMAND
STEP 291
END

FIG. 27

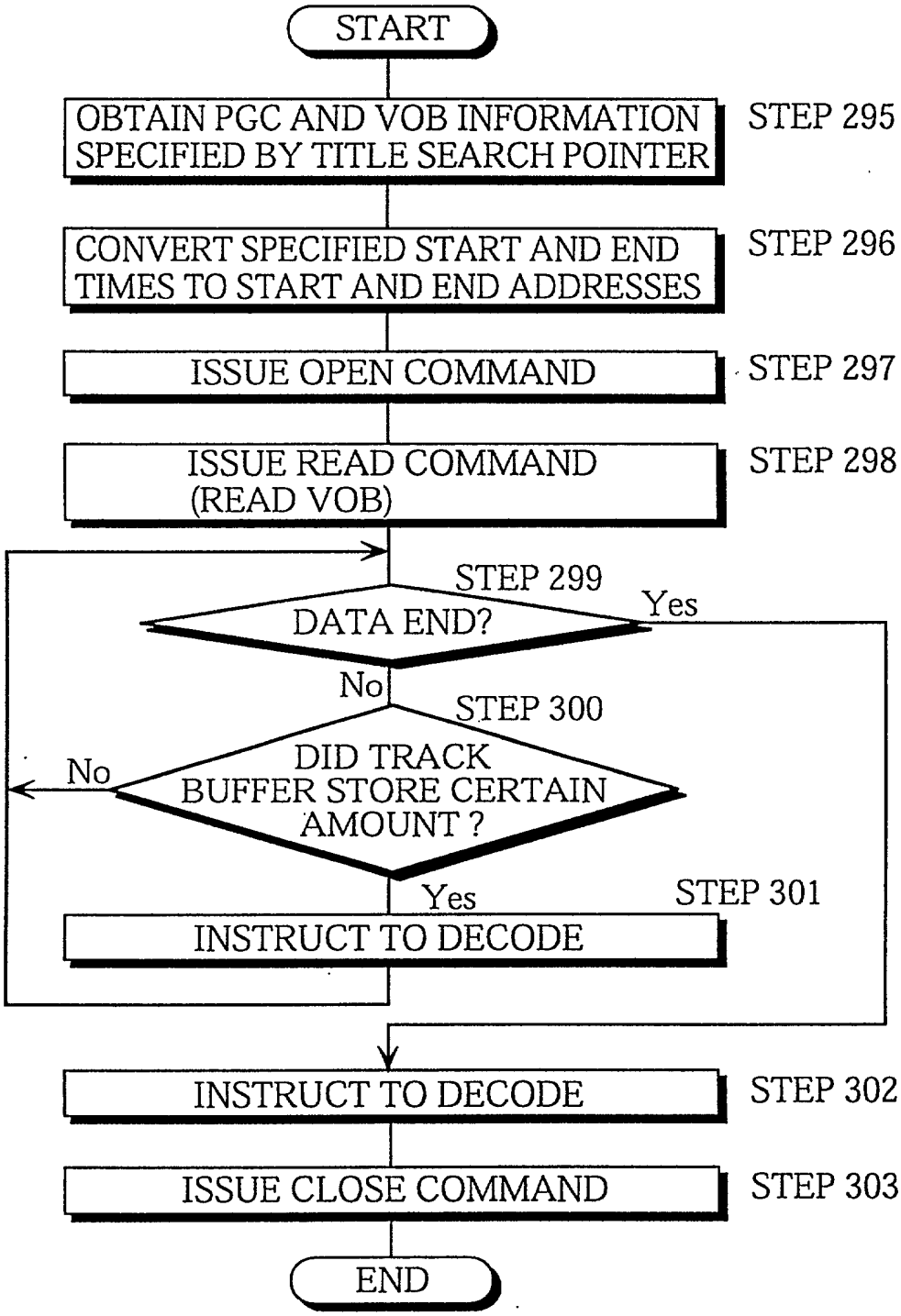
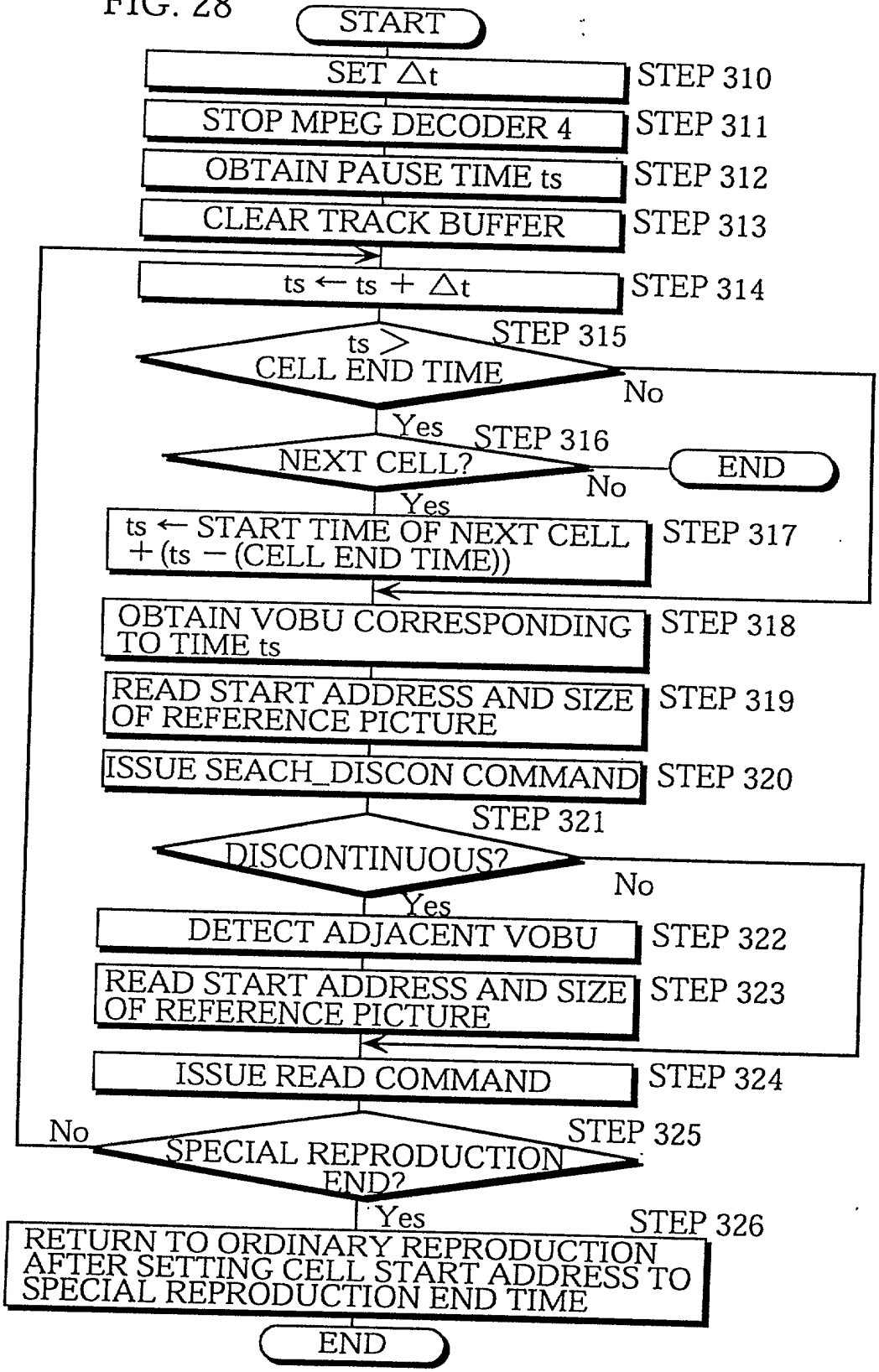

START
OBTAIN PGC AND VOB INFORMATION SPECIFIED BY TITLE SEARCH POINTER
STEP 295
CONVERT SPECIFIED START AND END TIMES TO START AND END ADDRESSES
STEP 296
ISSUE OPEN COMMAND
STEP 297
ISSUE READ COMMAND (READ VOB)
STEP 298
STEP 299
DATA END?
Yes
No
STEP 300
DID TRACK BUFFER STORE CERTAIN AMOUNT ?
No
Yes
STEP 301
INSTRUCT TO DECODE
INSTRUCT TO DECODE
STEP 302
ISSUE CLOSE COMMAND
STEP 303
END

FIG. 28


START
SET Δt
STEP 310
STOP MPEG DECODER 4
STEP 311
OBTAIN PAUSE TIME ts
STEP 312
CLEAR TRACK BUFFER
STEP 313
ts ← ts + Δt
STEP 314
ts > CELL END TIME
STEP 315
No
Yes
NEXT CELL?
STEP 316
END
No
Yes
ts ← START TIME OF NEXT CELL + (ts − (CELL END TIME))
STEP 317
OBTAIN VOBU CORRESPONDING TO TIME ts
STEP 318
READ START ADDRESS AND SIZE OF REFERENCE PICTURE
STEP 319
ISSUE SEACH_DISCON COMMAND
STEP 320
DISCONTINUOUS?
STEP 321
No
Yes
DETECT ADJACENT VOBU
STEP 322
READ START ADDRESS AND SIZE OF REFERENCE PICTURE
STEP 323
ISSUE READ COMMAND
STEP 324
No
SPECIAL REPRODUCTION END?
STEP 325
Yes
RETURN TO ORDINARY REPRODUCTION AFTER SETTING CELL START ADDRESS TO SPECIAL REPRODUCTION END TIME
STEP 326
END